

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference ITP 11	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US03/27659	International filing date (day/month/year) 03 September 2003 (03.09.2003)	Priority date (day/month/year) 07 October 2002 (07.10.2002)
International Patent Classification (IPC) or national classification and IPC IPC(7): B22F 9/28; C22B 34/12; C22C 14/00 and US Cl.: 75/351, 367, 369, 617, 619, 620		
Applicant INTERNATIONAL TITANIUM POWDER LLC		

- This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 5 sheets, including this cover sheet.  
☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of \_\_\_ sheets.

- This report contains indications relating to the following items:
  - ☒ Basis of the report
  - ☐ Priority
  - ☐ Non-establishment of report with regard to novelty, inventive step and industrial applicability
  - ☐ Lack of unity of invention
  - ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
  - ☐ Certain documents cited
  - ☐ Certain defects in the international application
  - ☐ Certain observations on the international application

Date of submission of the demand 07 April 2004 (07.04.2004)	Date of completion of this report 03 March 2005 (03.03.2005)
Name and mailing address of the IPEA/US Mail Stop PCT, Attn: IPEA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230	Authorized officer Roy V King Jean Proctor Paralegal Specialist Telephone No. 571-272-1700

Form PCT/IPEA/409 (cover sheet)(July 1998)

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## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US03/27659

**I. Basis of the report****1. With regard to the elements of the international application:\***

- ☒ the international application as originally filed.
- ☒ the description:  
pages 1-11 as originally filed  
pages NONE, filed with the demand  
pages NONE, filed with the letter of \_\_\_\_\_.
- ☒ the claims:  
pages 12-14, as originally filed  
pages NONE, as amended (together with any statement) under Article 19  
pages NONE, filed with the demand  
pages NONE, filed with the letter of \_\_\_\_\_.
- ☒ the drawings:  
pages 1-3, as originally filed  
pages NONE, filed with the demand  
pages NONE, filed with the letter of \_\_\_\_\_.
- ☐ the sequence listing part of the description:  
pages NONE, as originally filed  
pages NONE, filed with the demand  
pages NONE, filed with the letter of \_\_\_\_\_.

**2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.**

These elements were available or furnished to this Authority in the following language \_\_\_\_\_ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

**3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:**

- ☐ contained in the international application in printed form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

**4. ☐ The amendments have resulted in the cancellation of:**

- ☐ the description, pages NONE
- ☐ the claims, Nos. NONE
- ☐ the drawings, sheets/fig NONE

**5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).\*\***

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

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**V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. STATEMENT**

Novelty (N)	Claims <u>10-12, 14-17, 19-24</u>	YES
	Claims <u>1-9, 13, 18, 25-27</u>	NO
Inventive Step (IS)	Claims <u>16, 17</u>	YES
	Claims <u>1-15, 18-27</u>	NO
Industrial Applicability (IA)	Claims <u>1-27</u>	YES
	Claims <u>NONE</u>	NO

**2. CITATIONS AND EXPLANATIONS**

Please See Continuation Sheet

**Supplemental Box**

(To be used when the space in any of the preceding boxes is not sufficient)

**V. 2. Citations and Explanations:**

Claims 1-5, 13, 18, and 25-27 lack novelty under PCT Article 33(2) as being anticipated by Quin (US 2827371).

Quin discloses producing titanium by reacting titanium chloride vapor with sodium at a temperature below the melting point of sodium chloride and at which sodium would be in liquid form. According to Quin column 3, line 5, either of the reactants (chloride or sodium) may be present in excess. The resultant products are then cooled and separated into the desired titanium and whatever byproducts may be present. This would result in a product as defined in present claims 26 and 27 being produced. Thus, the claimed invention cannot be said to be novel in view of the disclosure of Quin.

Claims 1-9, 13, 18, and 25-27 lack novelty under PCT Article 33(2) as being anticipated by Armstrong et al. (US 2002/0005090 A1).

Armstrong et al. discloses making metal such as titanium by reducing titanium tetrachloride vapor using a liquid alkali or alkaline earth metal reductant. According to Armstrong et al. paragraph [0052], the two most common reducing agents used for the production of titanium are Na and Mg. According to claim 14 of Armstrong et al., the temperature of the element or alloy being produced does not exceed its sintering temperature. Table 1 of Armstrong et al. indicates that alloys containing titanium, aluminum and vanadium can be produced by such a process. The Armstrong et al. process would result in a product as defined in present claims 26 and 27 being produced. Thus, the claimed invention cannot be said to be novel in view of the disclosure of Armstrong et al.

Claims 10, 19-21, and 23 lack an inventive step under PCT Article 33(3) as being obvious over Quin.

Quin, discussed supra, does not specifically disclose cooling the products using an inert gas as set forth in the present claims. However, the artisan would want to ensure that any material the titanium products of Quin come into contact with once those products are produced is inert with respect to the titanium, so that the titanium may be collected and saved for future use without being contaminated or otherwise rendered unusable. Thus, it would have been an obvious expedient to utilize an inert gas for cooling purposes in the Quin process. Consequently, the claimed invention cannot be said to define an inventive step in view of the disclosure of Quin.

Claims 10-12, 14, 15 and 19-24 lack an inventive step under PCT Article 33(3) as being obvious over Armstrong et al.

Armstrong et al., discussed supra, does not specify the use of inert gas for cooling purposes as set forth in claims 10, 14, 15 and 19-24, nor does Armstrong et al. disclose making the specific alloy composition as recited in present claims 11 and 12. However, the artisan would want to ensure that any material the metal products of Armstrong et al. (e.g. titanium or Ti alloys) come into contact with once those products are produced is inert with respect to the metal, so that the metal may be collected and saved for future use without being contaminated or otherwise rendered unusable. Thus, it would have been an obvious expedient to utilize an inert gas for cooling purposes in the Armstrong et al. process. With regard to the alloys of claims 11 and 12, the production of materials having the particular compositions defined in those

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**Supplemental Box**

(To be used when the space in any of the preceding boxes is not sufficient)

claims would be within the purview of the Armstrong et al. process, as evidenced by Table 1 as well as claims 1 and 6 of Armstrong et al. Consequently, the claimed invention cannot be said to define an inventive step in view of the disclosure of Armstrong et al.

Claims 16 and 17 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest a process as claimed and in which a countercurrently flowing inert gas cools the reaction products and separates any excess halides of the product(s) before separation of the halide salt of the reducing metal from the product(s).

Claims 1-27 meet the criteria set out in PCT Article 33(4), and thus possess industrial applicability because the subject matter claimed can be made or used in industry.

# INTERNATIONAL SEARCH REPORT

International Classification No  
PCT/US 03/27659

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C22B34/12 B22F9/28 C22C1/04

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C22B B22F C22C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2 827 371 A (PATERSON QUIN JAMES) 18 March 1958 (1958-03-18) column 1, line 41 - column 2, line 2; figure 2; example 2 column 5, line 28 - line 34	1-15, 17-27
A	US 2002/0005090 A1 (ANDERSON RICHARD PAUL ET AL) 17 January 2002 (2002-01-17)	1
X	claims	18, 26, 27

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

28 January 2004

Date of mailing of the international search report

12.02.04

Name and mailing address of the ISA

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# INTERNATIONAL SEARCH REPORT

Internat application No.  
PCT/US 03/27659

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-17, 26

A method wherein the liquid phase of the reducing metal is present in an amount less than or equal to the amount needed to reduce the halide vapour to the elemental material or alloy and the product of said method.

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2. claims: 18-25, 27

A method wherein the liquid phase of the reducing metal is present in an amount in excess than or equal to the amount needed to reduce the halide vapour to the elemental material or alloy, the halide is chloride and the product of said method.

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 03/27659

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
US 2827371	A	18-03-1958	GB	717930 A		03-11-1954
			BE	515246 A		
			CH	308890 A		15-08-1955
			CH	328601 A		15-03-1958
			DE	1027881 B		10-04-1958
			FR	1069706 A		12-07-1954
			LU	31781 A1		
			NL	77870 C		
			NL	173516 B		
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US 2002005090	A1	17-01-2002	US	5958106 A		28-09-1999
			US	5779761 A		14-07-1998
			US	2002148327 A1		17-10-2002
			US	2002152844 A1		24-10-2002
			US	2003145682 A1		07-08-2003
			US	2003061907 A1		03-04-2003
			AU	686444 B2		05-02-1998
			AU	3320195 A		04-03-1996
			BR	9508497 A		23-12-1997
			CA	2196534 A1		15-02-1996
			CN	1161064 A , B		01-10-1997
			DE	69521432 D1		26-07-2001
			DE	69521432 T2		29-05-2002
			EP	0777753 A1		11-06-1997
			ES	2161297 T3		01-12-2001
			JP	10502418 T		03-03-1998
			JP	3391461 B2		31-03-2003
			KR	241134 B1		02-03-2000
			NO	970444 A		26-03-1997
			RU	2152449 C1		10-07-2000
			WO	9604407 A1		15-02-1996